

Claims

1. A network for implementing localized roaming of mobile subscribers, comprising: Base Transceiver Station BTS, Base Station Controller BSC, Mobile Switching Center MSC, Visiting
5 Location Register VLR and Home Location Register HLR; wherein further comprises at least a Roaming Number Manager RNM;

said Roaming Number Manager, connected with the HLR, is used to manage mobile phone numbers in the home region and the contracted roaming region; said RNM takes the collection of
10 obtained mobile phone numbers in the contracted roaming regions as a resource pool, and allocates the mobile phone numbers in the contracted roaming region to roaming subscribers dynamically.

2. A network for implementing localized roaming of mobile subscribers according to claim 1, wherein said Roaming Number
15 Manager RNM is embedded in said Home Location Register HLR.

3. A method for implementing localized roaming of mobile subscribers based on the network of claim, comprising:

a. configuring the RNM with number in contracted roaming
20 region/network, an independent PSTN/ISDN (Public Switched Telephone Network/Integrated Service Digital Network) number and a signaling point code;

b. configuring data in the entities of the contracted roaming region/network and that of the home network, so that the
25 subscriber location inquiry message taking the local number in the subscriber's roaming region/network as the destination address will be directed to RNM in the subscriber's home network;

c. establishing interfaces between the RNM and entities of the contracted roaming region/network as well as between the
30 RNM and entities of the home network;

d. the subscriber utilizing the configuration in respective entities of the contracted roaming region/network and the home network to develop communication services in the roaming region/network, implementing localized roaming of the subscriber.

4. A method for implementing localized roaming of mobile subscribers according to claim 3, wherein said step c comprises:

- c1. establishing an interface between RNM and MSC;
- c2. establishing an interface between RNM and HLR.

5. A method for implementing localized roaming of mobile subscribers according to claim 3, wherein said step d comprises a subscriber location update process:

d1. the Visiting Location Register VLR at which the subscriber is registered currently sends a location update request to the HLR in the subscriber's home region;

d2. according to the location update request received from the VLR and the subscriber's current location, the HLR in the subscriber's home region addressing the RNM corresponding to the subscriber's current location through the RNM's PSTN/ISDN number and informing RNM of the subscriber location update;

d3. the RNM allocating a mobile phone number, i.e., a number in the roaming region/network, to the subscriber, and returning said number in the roaming region/network to the HLR in the home region;

d4. the HLR in the subscriber's home region inserting said number in the roaming region/network in the VLR at which the subscriber is registered currently, and returning an acknowledgement message of obtaining said number in the roaming region/network to RNM.

6. A method for implementing localized roaming of mobile

subscribers according to claim 5, wherein in step d3, before allocating a mobile phone number to the subscriber, the RNM determines whether the roaming region where the subscriber's mobile phone is roaming is a contracted roaming region; if so, 5 RNM allocates one from the available numbers in the contracted roaming region and feeds it back to HLR in the home region; otherwise RNM feeds the subscriber's number in the original home region to HLR in the home region.

7. A method for implementing localized roaming of mobile 10 subscribers according to claim 6, wherein said method also comprises: when receiving an incoming call or initiating an outgoing call, the subscriber's mobile phone processes the call utilizing the number fed back from RNM in the subscriber's home region.

15 8. A method for implementing localized roaming of mobile subscribers according to claim 5, wherein in step d2, the subscriber is informed of the allocated number by voice, short message or Unstructured Supplementary Service Data (USSD).

9. A method for implementing localized roaming of mobile 20 subscribers according to claim 7, wherein the call is processed utilizing the number fed back from RNM in the subscriber's home region in the following manner: when serving as the caller, the subscriber's mobile phone uses the number fed back from the RNM in the subscriber's home region to initiate a call; when the 25 subscriber's mobile phone serves as the called, the Mobile Switching Center (MSC) in the subscriber's roaming region or the MSC in the subscriber's home region inquires for the call route in Home Location Register (HLR) in the subscriber's home region; the Home Location Register (HLR) in the subscriber's 30 home region inquires for the subscriber corresponding to the

called number in the Roaming Number Manager (RNM) in the subscriber's home region, to find corresponding subscriber record, and to obtain the address of Visiting Location Register (VLR) corresponding to the subscriber's roaming, and then
5 accesses said VLR to obtain routing information to instruct the Mobile Switching Center (MSC) in the subscriber's roaming region to establish the call.

10. A method for implementing localized roaming of mobile subscribers according to claim 5, 6, 7, 8 or 9, wherein said
10 method also comprises: when the subscriber's mobile phone leaves the contracted roaming region, the Home Location Register (HLR) in the subscriber's home region informs the Roaming Number Manager (RNM) in the subscriber's home region of the subscriber location update, the RNM in the subscriber's home region releases
15 the mobile phone number, occupied by the subscriber, in the old roaming region, and breaks the mapping between the number and the subscriber.

11. A method for implementing localized roaming of mobile phones according to claim 10, wherein said method also comprises:
20 binding the number in the contracted roaming region to a certain subscriber.

12. The method for implementing localized roaming of mobile subscribers as in claim 5, wherein it is according to the subscriber's IMSI (International Mobile Subscriber identifier)
25 that said VLR in step d1 addresses the HLR in the subscriber's home region.

13. A method for implementing localized roaming of mobile subscribers according to claim 5, wherein the information carried in the location update request sent from VLR to HLR in
30 step d1 and the parameters carried in the location update

informed from HLR to RNM in step d2 comprise: the subscriber's IMSI and/or the mobile phone number in the home region, the subscriber's current location information and the subscriber's old location.

5 14. A method for implementing localized roaming of mobile subscribers according to claim 5 or 12, wherein the subscriber location update process also comprises:

 d5. the HLR in the home region determining the RNM managing the subscriber's current location is not the one before
10 subscriber location update;

 d6. informing the RNM before subscriber location update according to the subscriber's old location information; said information to RNM containing the subscriber's old location information;

15 d7. the RNM before subscriber location update deleting the subscriber data, and sending a message to the HLR in the home region to acknowledge subscriber data deletion. 15. A method for implementing localized roaming of mobile subscribers according to claim 5 or 12, wherein the subscriber location
20 update process also comprises:

 After receiving an acknowledgement for subscriber data insertion from VLR, HLR sending a message to the RNM in the region where the subscriber stays currently to acknowledge the number receipt.

25 16. A method for implementing localized roaming of mobile subscribers according to claim 5 or 12, wherein the subscriber location update process also comprises: if not receiving the acknowledgement for number allocation from HLR, RNM will release the allocated number.

30 17. A method for implementing localized roaming of mobile

subscribers according to claim 3, wherein said step d comprises a process for calling the subscriber with the subscriber's number in roaming region/network; said process comprising the following steps:

5 d8. when the call is initiated with the called subscriber's number in the roaming region/network, a GMSC in the roaming region/network initiating a route inquiry to the RNM in the region where the subscriber stays currently;

 d9. after receiving the inquiry request, RNM inquiring for
10 the subscriber information according to the number in the roaming region, and inquiring HLR in home region for the calling route ;

 d10. the HLR in the home region returning the inquiry result to RNM, which sends an acknowledgement for route inquiry to the GMSC and instructing the GMSC to establish the route with the
15 number obtained from HLR.

 18. A method for implementing localized roaming of mobile subscribers according to claim 3, wherein said step d also comprises a process for calling the subscriber with the subscriber's number in the home network; said process comprising
20 the following steps:

 d11. when the call is initiated with the called subscriber's number in the home network, a GMSC in the home region inquiring for the route in the HLR in the subscriber's home region;

 d12. after receiving the inquiry request, the HLR in the home
25 region, according to the subscriber's number in the home region/network, requesting the VLR at which the subscriber is registered to allocate a roaming number;

 d13. the VLR at which the subscriber is registered allocating a roaming number to the subscriber, and returning said number
30 to the HLR;

d14. the HLR in the subscriber's home region sending an acknowledgement for route inquiry to the GMSC in the subscriber's home region, and instructing the GMSC to establish the route with the allocated roaming number.

5 19. A method for implementing localized roaming of mobile subscribers according to claim 3, wherein said step d also comprises a process of sending a short message to the subscriber's number in the roaming region/network; said process in detail comprising the following steps:

10 d15. the Short Message Service Center SC sending a short message to Short Message Service Gateway Mobile Switching Center SMS GMSC, which initiates a route inquiry to RNM;

15 d16. on receiving the inquiry request, RNM inquiring the subscriber information according to the number in the roaming region, and inquiring the HLR in subscriber's home region for the route ;

 d17. HLR returning the MSC number or the Service GPRS Supporting Node SGSN number where the subscriber stays currently to RNM;

20 d18. RNM sending an acknowledgement for route inquiry to SMS GMSC, to instruct the route for the short message with the MSC number or SGSN number obtained from HLR, and SMS GMSC issuing the short message.